Name:

at1118paper: Complete the Square (v410)

Example

By completing the square, find both solutions to the given equation:

$$x^2 - 58x = -517$$

Add $\left(\frac{-58}{2}\right)^2$, which equals 841, to both sides of the equation.

$$x^2 - 58x + 841 = 324$$

Factor the left side.

$$(x - 29)^2 = 324$$

Undo the squaring. We need to consider both $\pm\sqrt{324}$.

$$x - 29 = -18 \quad \text{or} \quad x - 29 = 18$$
$$x = -47 \quad \text{or} \quad x = -11$$

Question 1

By completing the square, find both solutions to the given equation:

$$x^2 + 40x = -399$$

$$x^2 + 40x + 400 = 1$$
$$(x + 20)^2 = 1$$
$$x + 20 = \pm 1$$
$$x = -21 \quad \text{or} \quad x = -19$$

Question 2

By completing the square, find both solutions to the given equation:

$$x^2 + 50x = -609$$

$$x^2 + 50x + 625 = 16$$
$$(x + 25)^2 = 16$$
$$x + 25 = \pm 4$$
$$x = -29 \quad \text{or} \quad x = -21$$

Question 3

By completing the square, find both solutions to the given equation:

$$x^2 - 20x = -84$$

$$x^2 - 20x + 100 = 16$$
$$(x - 10)^2 = 16$$
$$x - 10 = \pm 4$$
$$x = 6 \quad \text{or} \quad x = 14$$

Question 4

By completing the square, find both solutions to the given equation:

$$x^2 + 46x = 560$$

$$x^2 + 46x + 529 = 1089$$
$$(x + 23)^2 = 1089$$
$$x + 23 = \pm 33$$
$$x = -56 \quad \text{or} \quad x = 10$$

Question 5

By completing the square, find both solutions to the given equation:

$$x^2 - 40x = 624$$

$$x^2 - 40x + 400 = 1024$$
$$(x - 20)^2 = 1024$$
$$x - 20 = \pm 32$$
$$x = -12 \quad \text{or} \quad x = 52$$

Question 6

By completing the square, find both solutions to the given equation:

$$x^2 - 24x = 1300$$

$$x^2 - 24x + 144 = 1444$$
$$(x - 12)^2 = 1444$$
$$x - 12 = \pm 38$$
$$x = -26 \quad \text{or} \quad x = 50$$